**Amendments to the Claims:**

1. (Currently Amended) ~~Device~~A device for ~~the~~ *in vivo* determination of ~~the~~a concentration of a PET tracer in blood, including:

[[-]] an image-producing device ~~for the~~which generates a locally resolved depiction of a region of the body including a body volume that is filled with blood;

[[-]] a TOF-PET unit for recording the concentration of the PET tracer in a predetermined volume element;

[[-]] a data processing unit which is coupled to the image-producing device and the TOF-PET unit, the data processing unit in conjunction with the image-producing device determines a spatial position of the body volume that is filled with blood and ~~is arranged to set~~determines detector element positions of the TOF-PET unit ~~in~~ such ~~a way~~ that the volume element ~~that is recorded with this~~of the TOF-PET unit lies in ~~a~~ the body volume that is filled with blood[[,]] ~~wherein the spatial position of the body volume is determined with the aid of the image-producing device~~.

2. (Currently Amended) ~~Device~~The device as claimed in claim 1, wherein the TOF-PET unit comprises:

two γ detector elements that detect pairs of annihilation quanta, the two γ detector elements lie opposite one another and define the predetermined volume element on a line therebetween, and

~~the~~ corresponding evaluation electronics unit for recording ~~the~~ times of flight of the pairs of detected annihilation quanta.

3. (Currently Amended) ~~Device~~The device as claimed in claim 2, wherein the effective area of each detector element is ~~approximately~~between 10 $mm^2$ ~~to approximately~~and 400 $mm^2$.

4. (Currently Amended) ~~Device~~The device as claimed in claim 1, wherein the image-producing device includes one of an MRI device and[[/or]] an X-ray projection device[[,]] ~~in particular an X-ray computer tomography device~~.

5. (Currently Amended) ~~Device~~The device as claimed in claim 1, ~~wherein it includes~~further including a 3D PET device ~~for preferably~~which records a three-dimensional ~~recording of the~~ distribution of the PET tracer in a body region.

6. (Currently Amended) ~~Device~~The device as claimed in claim 1, wherein the data processing unit ~~is set up to~~ segments ~~a body volume that is filled with blood into~~ images produced by the image-producing device to identify the body volume that is filled with blood.

7. (Currently Amended) ~~Device~~The device as claimed in claim 1, ~~wherein it includes~~further including a display device for ~~depicting illustrations~~ displaying images that have been produced with the image-producing device[[,]] ~~as well as~~ and an input means for interactive selection of a body volume in ~~these~~ the displayed images.

8. (Currently Amended) ~~Device~~The device as claimed in claim 1, wherein the body volume filled with blood lies in ~~the~~an aorta or in ~~the~~a left ventricle of ~~the~~a heart.

9. (Previously Presented) A method for the *in vivo* determination of the concentration of a PET tracer in the blood, comprising the steps of:

- production of at least one locally resolved image of a body region;
- determination of the spatial position of a body volume filled with blood on the basis of the image produced;
- recording of annihilation quanta coming out of the body volume, taking account of their times of flight.

10. (Currently Amended) [[A]]The method as claimed in claim 9, ~~wherein~~ further including:

recording [[a]] dynamic, ~~preferably~~ three-dimensional, PET ~~recording of~~ data in a further body region ~~takes place~~, and ~~that the data obtained here are combined with the established~~ combining the determined concentration of the PET tracer in the blood with the dynamic PET data.

11. (New) The device as claimed in claim 2, wherein the TOF-PET unit includes only two detector elements to detect annihilation quanta pairs travelling along the line therebetween.

12. (New) A method of determining a concentration of a PET tracer *in vivo*, the method comprising:

generating a diagnostic image of a region of a patient, which region includes a blood filled body volume;

identifying a location of the blood filled body volume from the diagnostic image;

determining positions of a pair of TOF-PET detectors on opposite sides of the blood filled body volume such that a line between the pair of TOF-PET detectors passes through the blood filled body volume;

detecting pairs of annihilation quanta from a PET tracer in the blood with the pair of TOF-PET detectors;

using time of flight information to identify pairs of annihilation quanta emitted from the blood filled body volume;

determining a concentration of the PET tracer in the blood from the detected annihilation quanta pairs emitted from the blood in the blood filled body volume.

13. (New) The method as claimed in claim 12, further including:

generating temporally dynamic PET images of another region of the patient concurrently with determining the concentration of PET tracer in the blood;

associating the temporally dynamic PET images with the concurrently determined PET tracer concentration.

14. (New) A device for determining a concentration of a PET tracer in blood *in vivo*, the device comprising:

a diagnostic imaging device;

a pair of TOF-PET detectors; and

a data processor programmed to control the diagnostic imaging device and the pair of TOF-PET detectors and perform **the method as claimed in claim 12**.

15. (New) The device as claimed in claim 14, wherein the pair of TOF-PET detectors is a one-dimensional that determines annihilation event locations along the line between the pair of TOF-PET detectors.

16. (New) The method as claimed in claim 12, further including:

positioning the pair of TOF-PET detectors such that the line therebetween passes through the blood filled cavity.

17. (New) The device as claimed in claim 2, wherein the data processing unit further controls positioning the two $\gamma$ detector elements such that the volume element on the line therebetwcen lies in the body volume.